

ABSTRACT

A waveguide grating device that utilizes the guided-mode resonance effect in a waveguide having an endface on which a waveguide grating is fabricated. The waveguide grating has a waveguide layer, which is waveguide separate from the waveguide on which the waveguide grating is fabricated, and a grating layer. Also disclosed is a system for spectral filtering. The system utilizes a guided-mode resonance effect in a waveguide, and includes a waveguide grating device. The waveguide grating fabricated on the end of the waveguide grating device has a plurality of variable parameters such as permittivity of the grating layer(s) and permittivity of the waveguide layer(s). For the disclosed waveguide gratings, the waveguide layer and the grating layer may be the same layer. The system also includes a source coupled to the proximal end of the waveguide for propagating a signal therethrough. Methods for forming the disclosed waveguide grating devices are included. Such methods include providing waveguides having ends with endfaces, and fabricating waveguide gratings on the endfaces to form the waveguide grating devices. Methods of detecting one or more parameters of a medium are also disclosed. The methods include providing a waveguide grating device, contacting the waveguide grating with a medium, propagating a signal having at least one signal attribute through the waveguide, and comparing the modified signal attribute to a known signal attribute to detect a parameter of the medium.